

4th
5th
6th
7th
8th

Grade
8

meapTM
Michigan Educational Assessment Program

Item Descriptors



MATHEMATICS
FALL 2012

**MICHIGAN STATE BOARD OF EDUCATION
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NOTE: For each item listed throughout this booklet, the first statement is a summary of the Michigan Grade Level Content Expectation (GLCE) and the second statement is the descriptor for the item's stem or question.

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Students were instructed to read the directions below silently as the test administrator read them aloud.

PART 1

DIRECTIONS:

In this part, you will answer multiple-choice mathematics questions. Some questions will ask you to view a picture, chart, or other mathematics-related information. Use that information with what you know to answer the question. You may **NOT** use a calculator for this part of the test.

You must mark all of your answers in Part 1 of your **Answer Document** with a No. 2 pencil. You may underline, circle, or write in this test booklet to help you, but nothing marked in this test booklet will be scored. No additional paper may be used.

Mark only one answer for each question. Completely fill in the corresponding circle on your **Answer Document**. If you erase an answer, be sure to erase completely. Remember that if you skip a question in the test booklet, you need to skip the answer space for that question on the **Answer Document**. If you are not sure of an answer, mark your **best** choice.

A sample question is provided for you below.

Sample Multiple-Choice Question:

Marty wants to put 75 CDs into cases. Each case holds exactly 8 CDs. What is the **least** number of cases that Marty will need to hold all his CDs?

- A** 8
- B** 9
- C** 10
- D** 11

For this sample question, the correct answer is **C**. Circle **C** is filled in for the sample question on your **Answer Document**.

Once you have reached the word **STOP** in your test booklet, do **NOT** go on to the next page. If you finish early, you may go back and check your work in Part 1 of the test **ONLY**. Check to make sure that you have answered every question. Do **NOT** look at any other part of the test.

NOTE: The directions for Part 2 are the same as the above instructions, but with calculators allowed.

MEAP GRADE 8 MATHEMATICS TEST

Reference Sheet

Use this information as needed to answer questions on the MEAP Grade 8 Test.

Miscellaneous

Distance = rate \times time

Interest = principal \times rate \times time

$$\pi \approx 3.14$$

Algebra

Straight Line: $y = mx + b$

If (x_1, y_1) and (x_2, y_2) are on a line, then

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Area



Triangle:

$$A = \frac{1}{2} (\text{base}) \times \text{height}$$



Rectangle:

$$A = \text{base} \times \text{height}$$



Trapezoid:

$$A = \frac{1}{2} (\text{sum of the bases}) \times \text{height}$$



Parallelogram:

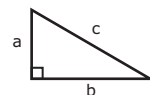
$$A = \text{base} \times \text{height}$$









Circle:

$$A = \pi r^2 \quad \text{Circumference} = 2\pi r = \pi d$$

Right Triangles



$$a^2 + b^2 = c^2$$

Total Surface Area		Volume	
Cylinder:	SA = circumference of the base \times height + $2\pi r^2$		$V = \pi r^2 \times \text{height}$
Cube:	SA = $6 \times (\text{length of edge})^2$		$V = (\text{length of edge})^3$
Pyramid:	SA = $\frac{1}{2}$ (perimeter of base) \times (slant height) + area of the base		$V = \frac{1}{3}$ (area of base) \times (altitude)
Sphere:	SA = $4\pi r^2$		$V = \frac{4}{3} \pi r^3$
Cone:	SA = $\frac{1}{2}$ (circumference of base) \times (slant height) + πr^2		$V = \frac{1}{3} \pi r^2 \times \text{height}$
Prism:	SA = sum of the area of the faces		$V = \text{area of base} \times \text{height}$

- 1 N.FL.07.07:** Solve problems involving operations with integers.

Calculate change in temperature in degrees Fahrenheit.

- A** $-[a - (-b)] = a - (-b)$
- B** $-[a - (-b)] = a + (-b)$
- C** $-[a - (-b)] = -[a + (-b)]$
- D** correct

- 2 N.FL.07.07:** Solve problems involving operations with integers.

Compute with integers in context of diving.

- A** $-a + b = -a - b$
- B** $-a + b = -(-a + b)$
- C** correct
- D** $-a + b = a + b$

- 3 N.FL.07.08:** Add, subtract, multiply, and divide positive and negative rational numbers fluently.

Multiply positive integer by negative fraction.

- A** $a(-b/c) = -c$
- B** correct
- C** $a(-b/c) = b/c$
- D** $a(-b/c) = c/b$

- 4 N.FL.07.08:** Add, subtract, multiply, and divide positive and negative rational numbers fluently.

Divide a negative fraction by a negative fraction.

- A** $(-a/b)/(-c/d) = (-a/b)/(c/d)$
- B** $(-a/b)/(-c/d) = (-a/b) \times (c/d)$
- C** $(-a/b)/(-c/d) = (-a/b) \times (-c/d)$
- D** correct

- 5 N.FL.07.09:** Estimate results of computations with rational numbers.

Estimate fractional portion of mixed number.

- A** underestimate
- B** correct
- C** overestimate
- D** overestimate

- 6 N.FL.07.09:** Estimate results of computations with rational numbers.

Estimate fractional portion of positive integer.

- A** underestimate
- B** underestimate
- C** underestimate
- D** correct

- 7 A.PA.07.01:** Recognize when information given in a table, graph, or formula suggests a directly proportional or linear relationship.

Determine if pattern in context is linear and justify.

- A** linear but incorrect justification
- B** correct
- C** nonlinear
- D** nonlinear

- 8 A.PA.07.05:** Recognize and use directly proportional relationships of the form $y = mx$, and distinguish from linear relationships of the form $y = mx + b$, b non-zero; understand that in a directly proportional relationship between two quantities one quantity is a constant multiple of the other quantity.

Describe similarity between the graphs of two equations.

- A** correct
- B** not a shared characteristic
- C** not a shared characteristic
- D** not a shared characteristic

- 9 A.PA.07.01:** Recognize when information given in a table, graph, or formula suggests a directly proportional or linear relationship.

Determine which equation suggests a linear relationship between variables.

- A** correct
- B** quadratic
- C** cubic
- D** hyperbola

- 10 A.RP.07.02:** Represent directly proportional and linear relationships using verbal descriptions, tables, graphs, and formulas, and translate among these representations.

Match given table to linear equation.

- A** additive inverse of slope
- B** correct equation for only one pair of variables
- C** correct
- D** correct equation for only first pair of variables

- 11 A.RP.07.02:** Represent directly proportional and linear relationships using verbal descriptions, tables, graphs, and formulas, and translate among these representations.

Match given table to linear equation.

- A** twice the correct slope
- B** correct
- C** additive inverse of correct slope
- D** twice the additive inverse of correct slope, additive inverse of correct y-intercept

- 12 A.RP.07.10:** Know that the graph of $y = k/x$ is not a line; know its shape, and know that it crosses neither the x- nor the y-axis.

Match given graph of $y = kx$ to equation.

- A** $y = k/x$ equals $y = x + k$
- B** $y = k/x$ equals $y = x - k$
- C** $y = k/x$ equals $y = x/k$
- D** correct

- 13 A.RP.07.10:** Know that the graph of $y = k/x$ is not a line; know its shape, and know that it crosses neither the x- nor the y-axis.

Describe characteristic of the graph of $y = kx$.

- A** correct
- B** not a characteristic
- C** not a characteristic
- D** not a characteristic

- 14 N.FL.07.03:** Calculate rates of change including speed.

Calculate rate of growth in inches per year.

- A** half of correct rate
- B** correct
- C** one more inch per year than correct rate
- D** twice the correct rate

- 15 N.FL.07.03:** Calculate rates of change including speed.

Calculate the greatest miles per gallon from a table.

- A** correct
- B** intermediate miles traveled and gallons
- C** least miles per gallon
- D** greatest miles traveled

- 16 N.MR.07.04:** Convert ratio quantities between different systems of units, such as feet per second to miles per hour.

Calculate rate of change in temperature in degrees Fahrenheit.

- A** 1/10 of correct rate
- B** correct
- C** 10 times greater than correct rate
- D** 100 times greater than correct rate

- 17 N.MR.07.04:** Convert ratio quantities between different systems of units, such as feet per second to miles per hour.

Convert miles per hour to feet per second, given 1 mile = 5,280 feet and 1 hour = 3,600 seconds.

- A** mph \times 3,600/5,280
- B** miles per hour = feet per second
- C** 5,280/mph
- D** correct

- 18 N.FL.07.05:** Solve proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation $a/b = c/d$; know how to see patterns about proportional situations in tables.

Convert kilometers to miles given 1 mile is approximately equal to 1.61 kilometers.

- A** kilometers/miles
- B** correct
- C** kilometers + miles
- D** miles \times kilometers

- 19 N.FL.07.05:** Solve proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation $a/b = c/d$; know how to see patterns about proportional situations in tables.

Determine length of model of car given scale: x cm = y feet.

- A** (length of car/ x) cm
- B** correct
- C** (length of car + x + y) cm
- D** (length of car times y/x) cm

- 20 A.FO.07.12:** Add, subtract, and multiply simple algebraic expressions of the first degree. e.g., $(92x + 8y) - 5x + y$, or $x(x + 2)$, and justify using properties of real numbers.

Subtract linear expression from positive integer.

- A** $a - (bx - c) = -bx + a - c$
- B** $a - (bx - c) = bx + a - c$
- C** correct
- D** $a - (bx - c) = -bx - a - c$

- 21 A.FO.07.12:** Add, subtract, and multiply simple algebraic expressions of the first degree. e.g., $(92x + 8y) - 5x + y$, or $x(x + 2)$, and justify using properties of real numbers.

Multiply positive integer by linear expression.

- A** correct
- B** $a(bx - cy) = (ab)x - cy$
- C** $a(bx - cy) = (ab - c)xy$
- D** $a(bx - cy) = axy$

- 22 A.FO.07.12:** Add, subtract, and multiply simple algebraic expressions of the first degree. e.g., $(92x + 8y) - 5x + y$, or $x(x + 2)$, and justify using properties of real numbers.

Multiply positive integer by linear expression.

- A** $a(bx + c) = a(b + c)x$
- B** $a(bx + c) = (a + b)x + (a + c)$
- C** $a(bx + c) = (ab)x + c$
- D** correct

- 23 A.FO.07.13:** From applied situations, generate and solve linear equations of the form $ax + b = c$ and $ax + b = cx + d$, and interpret solutions.

Find the rental car miles resulting in the same charge from two agencies.

- A** different total charges
- B** different total charges
- C** correct
- D** different total charges

- 24 A.FO.07.13:** From applied situations, generate and solve linear equations of the form $ax + b = c$ and $ax + b = cx + d$, and interpret solutions.

Match context of renting greatest number of video games to equation.

- A** $ax + b = c$ equals $bx + a = c$
- B** correct
- C** $ax + b = c$ equals $bx + c = a$
- D** $ax + b = c$ equals $ax + c = b$

- 25 A.PA.07.04:** For directly proportional or linear situations, solve applied problems using graphs and equations; e.g., the heights and volume of a container with uniform cross-section; height of water in a tank being filled at a constant rate; degrees Celsius and degrees Fahrenheit; distance and time under constant speed.

Determine distance, given the time and rate.

- A** rate/distance
- B** time + distance
- C** used slower rate
- D** correct

- 26 A.PA.07.04:** For directly proportional or linear situations, solve applied problems using graphs and equations; e.g., the heights and volume of a container with uniform cross-section; height of water in a tank being filled at a constant rate; degrees Celsius and degrees Fahrenheit; distance and time under constant speed.

Convert from Celsius to Fahrenheit given $F = 1.8C + 32$.

- A** $1.8 \times$ given Celsius temperature
- B** $32 +$ given Celsius temperature
- C** correct
- D** $1.8(\text{given Celsius temperature} + 32)$

- 27 A.PA.07.04:** For directly proportional or linear situations, solve applied problems using graphs and equations; e.g., the heights and volume of a container with uniform cross-section; height of water in a tank being filled at a constant rate; degrees Celsius and degrees Fahrenheit; distance and time under constant speed.

Interpret distance-time line graph.

- A** less than correct distance
- B** correct
- C** greater than correct distance
- D** greater than correct distance

- 28 A.PA.07.05:** Recognize and use directly proportional relationships of the form $y = mx$, and distinguish from linear relationships of the form $y = mx + b$, b non-zero; understand that in a directly proportional relationship between two quantities one quantity is a constant multiple of the other quantity.

Calculate the number of cookies, given the proportion.

- A** omitted factor
- B** omitted factor
- C** correct
- D** repeated factor

- 29 A.PA.07.05:** Recognize and use directly proportional relationships of the form $y = mx$, and distinguish from linear relationships of the form $y = mx + b$, b non-zero; understand that in a directly proportional relationship between two quantities one quantity is a constant multiple of the other quantity.

Select equation that models directly proportional relationship.

- A** linear, but not directly proportional
- B** linear, but not directly proportional
- C** linear, but not directly proportional
- D** correct

- 30 A.PA.07.09:** Recognize inversely proportional relationships in contextual situations; know that quantities are inversely proportional if their product is constant, e.g., the length and width of a rectangle with fixed area, and that an inversely proportional relationship is of the form $y = k/x$ where k is some non-zero number.

Given table of values, translate to an equation.

- A** $y = x/0.5k$
- B** $y = 0.5k/x$
- C** $y = x/k$
- D** correct

- 31 A.PA.07.09:** Recognize inversely proportional relationships in contextual situations; know that quantities are inversely proportional if their product is constant, e.g., the length and width of a rectangle with fixed area, and that an inversely proportional relationship is of the form $y = k/x$ where k is some non-zero number.

Given a table of values, translate to an equation.

- A** $y = x/0.5k$
- B** correct
- C** $y = x/k$
- D** $y = 0.5k/x$

- 32 A.PA.07.11:** Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.

Solve linear equation.

- A** twice the additive inverse
- B** additive inverse
- C** incorrect solution
- D** correct

- 33 A.PA.07.11:** Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.

Solve linear equation.

- A** half of correct value
- B** correct
- C** difference between constants
- D** constant

- 34 D.RE.07.01:** Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions.

Find lower quartile of test scores from box-and-whisker plot.

- A** minimum score
- B** correct
- C** median
- D** third quartile

- 35 D.RE.07.01:** Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions.

Interpret stem-and-leaf plot to find the range.

- A** greatest value of 4th stem - least value of 2nd stem
- B** minimum value of middle stem - maximum value of middle stem
- C** minimum value of greatest stem - maximum value of least stem
- D** correct

- 36 D.RE.07.01:** Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions.

Interpret circle graph to determine number of students that chose tacos as their favorite lunch.

- A** given percentage
- B** correct
- C** sum of two given percentages
- D** $100 +$ given percentage

- 37 D.RE.07.01:** Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions.

Interpret circle graph to determine amount spent on rent.

- A** given percentage times 10 as dollar value
- B** incorrect category
- C** incorrect category
- D** correct

- 38 D.AN.07.03:** Calculate and interpret relative frequencies and cumulative frequencies for given data sets.

Determine relative frequency of results using table.

- A** correct
- B** used 100 as total instead of given total
- C** $1/\text{number of categories}$
- D** incorrect category

- 39 D.AN.07.03:** Calculate and interpret relative frequencies and cumulative frequencies for given data sets.

Interpret table to determine relative frequency of brands of pizzas with given number of grams of fat.

- A** used 100 as total number of brands instead of given number of brands
- B** $1/100$ of cumulative frequency of brands of pizzas with given amount of fat or less
- C** correct
- D** number of pizza brands with given amount of fat or less divided by total number of brands

- 40 D.AN.07.04:** Find and interpret the median, quartiles, and interquartile range of a given set of data.

Determine the median of list of numbers.

- A** minimum
- B** correct
- C** mode
- D** maximum

- 41 D.AN.07.04:** Find and interpret the median, quartiles, and interquartile range of a given set of data.

Given the median of n test scores, determine total percent of scores that are greater than or equal.

- A** less than correct percentage
- B** correct
- C** greater than correct percentage
- D** greater than correct percentage

- 42 G.TR.07.03:** Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.

Identify true statement about similar quadrilaterals.

- A** non-corresponding side lengths are equal
- B** non-corresponding side lengths are equal
- C** non-corresponding angle measures are equal
- D** correct

- 43 G.TR.07.03:** Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.

Given four triangles and their side lengths, identify pair of similar triangles.

- A** not similar
- B** not similar
- C** not similar
- D** correct

- 44 G.TR.07.04:** Solve problems about similar figures and scale drawings.

Given pair of similar parallelograms, identify true statement about angle measures.

- A** incorrect statement
- B** incorrect statement
- C** correct
- D** incorrect statement

- 45 G.TR.07.04:** Solve problems about similar figures and scale drawings.

Use scale and measurements to determine size of drawing of classroom.

- A** inconsistent, incorrect scale
- B** correct
- C** 1 cm = 1 foot
- D** x cm = y feet equals y cm = x feet

- 46 G.TR.07.05:** Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.

Identify correct statement about similar triangles.

- A** not always true
- B** not always true
- C** correct
- D** not always true

- 47 G.TR.07.05:** Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.

Given a diagram of two triangles, find the measurement needed to show similarity by SAS.

- A** correct
- B** correct measurement but incorrect side
- C** incorrect measurement, correct side
- D** incorrect measurement, incorrect side

- 48 G.TR.07.06:** Understand and use the fact that when two triangles are similar with scale factor of r , their areas are related by a factor of r^2 .

Given the scale factor, find the area of second rectangle.

- A** area of first rectangle
- B** used scale factor of r
- C** used scale factor of $2r$
- D** correct

- 49 G.TR.07.03:** Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.

Identify correct statement about similar triangles.

- A** non-corresponding angles are congruent
- B** non-corresponding angles are congruent
- C** non-corresponding angles are congruent
- D** correct

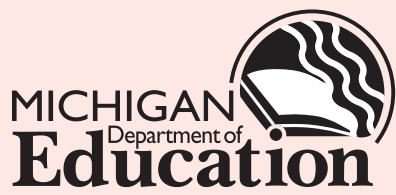
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Bureau of Assessment and Accountability (BAA)
Michigan Educational Assessment Program (MEAP)
Phone: 1-877-560-8378
Website: www.michigan.gov/meap
Email: baa@michigan.gov